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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : Jack C. Wybenga, et al.
Serial No. : 10/783,936
Filed : February 20, 2004
For : APPARATUS AND METHOD FOR MANAGING
TRAFFIC AND QUALITY OF SERVICE IN A HIGH-
SPEED ROUTER
Group No. : 2462
Examiner : Christine T. Duong
Confirmation No. : 7287

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AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

This communication responds to the Final Office Action dated January 5, 2010, which has a shortened statutory period for reply set to expire on January 5, 2010. As this Response is being filed within two months of the mailing date of the Final Office Action, the Applicants request an Advisory Action.

Please amend the above-identified patent application as follows.

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows. Any other difference between the claims below and the previous state of the claims is unintentional and in the nature of a typographical error.

1. (Currently Amended) A router for interconnecting external devices coupled to said router, said router comprising:

a switch fabric configured to perform traffic prioritization and quality of service functions in a single process at the switch fabric; and

a plurality of routing nodes coupled to said switch fabric, wherein each of said plurality of routing nodes comprises packet processing circuitry capable of transmitting data packets to, and receiving data packets from, said external devices and further capable of transmitting data packets to, and receiving data packets from, other ones of said plurality of routing nodes via said switch fabric,

wherein said switch fabric is capable of detecting that the output bandwidth of a first output of said switch fabric has been exceeded and, in response to said detection, said switch fabric ~~uses a credit-based system to cause~~ causing a first one of said plurality of routing nodes to slow an input rate of data packets transmitted from said first routing node to a first input of said switch fabric, ~~said first routing node comprising a first queue, wherein the first queue loses credit when a size of the first queue exceeds an upper threshold and the first queue gains credit when the size of the first queue falls below a lower threshold~~; said data packets having a plurality of priority levels.

2. (Original) The router as set forth in Claim 1 wherein said switch fabric implements a Weighted Fair Queuing algorithm to slow said input rate of data packets from said first routing node.

3. (Currently Amended) The router as set forth in Claim 1 wherein said ~~first queue of~~ the first routing node comprises a first queue comprising a plurality of prioritized buffers capable of storing data packets to be transmitted to said switch fabric.

4. (Original) The router as set forth in Claim 3 wherein said first routing node slows down a rate at which data packets are transmitted to said switch fabric from said first queue.

5. (Original) The router as set forth in Claim 4 wherein said first routing node selects data packets to be transferred to said switch fabric from a first one of said plurality of prioritized buffers according to a priority value associated with said first prioritized buffer.

6. (Original) The router as set forth in Claim 5 wherein said first routing node causes a first one of said external devices to slow a rate at which data packets are transmitted to said first queue.

7. (Original) The router as set forth in Claim 3 wherein said first routing node routes said data packets using Layer 3 routing information.

8. (Original) The router as set forth in Claim 7 wherein said Layer 3 routing information comprises an Internet protocol (IP) address.

9. (Original) The router as set forth in Claim 3 wherein said first routing node routes said data packets using Layer 2 medium access control (MAC) address information.

10. (Currently Amended) A communication network comprising a plurality of routers that communicate data packets to one another and to interfacing external devices, each of said plurality of routers comprising:

a switch fabric configured to perform traffic prioritization and quality of service functions in a single process at the switch fabric; and

a plurality of routing nodes coupled to said switch fabric, wherein each of said plurality of routing nodes comprises packet processing circuitry capable of transmitting data packets to, and receiving data packets from, said external devices and further capable of transmitting data packets to, and receiving data packets from, other ones of said plurality of routing nodes via said switch fabric,

wherein said switch fabric is capable of detecting that the output bandwidth of a first output of said switch fabric has been exceeded and, in response to said detection, said switch fabric ~~uses a credit-based system to cause~~ causing a first one of said plurality of routing nodes to slow an input rate of data packets transmitted from said first routing node to a first input of said switch fabric, ~~said first routing node comprising a first queue, wherein the first queue loses credit when a size of the first queue exceeds an upper threshold and the first queue gains credit when the size of the first queue falls below a lower threshold~~, said data packets having a plurality of priority levels.

11. (Original) The communication network as set forth in Claim 10 wherein said switch fabric implements a Weighted Fair Queuing algorithm to slow said input rate of data packets from said first routing node.

12. (Currently Amended) The communication network as set forth in Claim 10 wherein said ~~first queue of the~~ first routing node comprises a first queue comprising a plurality of prioritized buffers capable of storing data packets to be transmitted to said switch fabric.

13. (Original) The communication network as set forth in Claim 12 wherein said first routing node slows down a rate at which data packets are transmitted to said switch fabric from said first queue.

14. (Original) The communication network as set forth in Claim 13 wherein said first routing node selects data packets to be transferred to said switch fabric from a first one of said plurality of prioritized buffers according to a priority value associated with said first prioritized buffer.

15. (Original) The communication network as set forth in Claim 14 wherein said first routing node causes a first one of said external devices to slow a rate at which data packets are transmitted to said first queue.

16. (Original) The communication network as set forth in Claim 12 wherein said first routing node routes said data packets using Layer 3 routing information.

17. (Original) The communication network as set forth in Claim 16 wherein said Layer 3 routing information comprises an Internet protocol (IP) address.

18. (Original) The communication network as set forth in Claim 12 wherein said first routing node routes said data packets using Layer 2 medium access control (MAC) address information.

19. (Currently Amended) For use in a router comprising a switch fabric and a plurality of routing nodes, each of the routing nodes comprising packet processing circuitry for transmitting data packets to, and receiving data packets from, external devices and other routing nodes via the switch fabric, a method of routing data packets comprising the steps of:

in the switch fabric, performing traffic prioritization and quality of service functions in a single process,

in the switch fabric, detecting that the output bandwidth of a first output of the switch fabric has been exceeded; and

in response to the detection, ~~using a credit-based system to cause~~ causing a first routing node to slow an input rate of data packets transmitted from the first routing node to a first input of the switch fabric, ~~said first routing node comprising a first queue, wherein the first queue loses credit when a size of the first queue exceeds an upper threshold and the first queue gains credit when the size of the first queue falls below a lower threshold,~~ said data packets having a plurality of priority levels.

20. (Original) The method as set forth in Claim 19 wherein the switch fabric implements a Weighted Fair Queuing algorithm to slow the input rate of data packets from the first routing node.

21. (Currently Amended) The method as set forth in Claim 19 wherein the ~~first queue of~~ the first routing node comprises a first queue comprising a plurality of prioritized buffers capable of storing data packets to be transmitted to the switch fabric.

22. (Original) The method as set forth in Claim 21 further comprising the step of selecting data packets to be transferred to the switch fabric from a first one of the plurality of prioritized buffers according to a priority value associated with the first prioritized buffer.

23. (Previously Presented) The method as set forth in Claim 22 further comprising the step of causing the first external device to slow a rate at which data packets are transmitted to the first queue.

REMARKS

Claims 1-23 are pending in this application.

Claims 1-23 are rejected.

Claims 1, 3, 10, 12, 19, and 21 have been amended as shown above.

Reconsideration of the claims is respectfully requested.

I. INTERVIEW SUMMARY

A telephonic interview was conducted on March 2, 2010, between the Applicants' representative and Examiner Duong. The Applicants would like to thank Examiner Duong for her time and consideration during this interview.

In the interview, the Applicants and Examiner Duong discussed the 103 claim rejections in the January 5, 2010, Office Action. Specifically, the Applicants and Examiner Duong discussed ways to overcome the 103 rejection by amending the claims to include one or more features related to the quality of service and traffic shaping that occur in the switch fabric, as described in paragraphs [057]-[060] of the Applicants' disclosure. The Applicants agreed to amend the claims with a plan to file a Request for Continued Examination in order to have the claim amendments entered. Examiner Duong agreed to review the claim amendments with her supervisor to help further prosecution.

II. CLAIM REJECTION UNDER 35 U.S.C. § 103

Claims 1, 3-5, 7, 8, 10, 12-14, 16, 17, 19, 21, and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,654,343 to *Brandis et al.* (“Brandis”) in view of U.S. Patent No. 6,563,837 to *Krishna et al.* (“Krishna”) and further in view of U.S. Patent No. 5,867,480 to *Thomas et al.* (“Thomas”). Claims 2, 11, and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brandis, Krishna, and Thomas, and further in view of U.S. Patent Publication No. 2004/0179542 to *Murakami et al.* (“Murakami”). Claims 6, 15, and 23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brandis, Krishna, and Thomas, and further in view of U.S. Patent No. 6,289,021 to *Hesse* (“Hesse”). Claims 9 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brandis, Krishna, and Thomas, and further in view of U.S. Patent Publication No. 2002/0135843 to *Gruia*. (“Gruia”). The Applicants respectfully traverse the rejections.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142, p. 2100-127 (8th ed. rev. 7 July 2008). Absent such a *prima facie* case, the applicant is under no obligation to produce evidence of nonobviousness. *Id.*

To establish a *prima facie* case of obviousness, three basic criteria must be met: First, there must be some reason – such as a suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art – to modify the reference or to combine reference teachings. MPEP § 2142, pp. 2100-127 to 2100-128 (8th ed. rev. 7 July 2008); MPEP § 2143, pp. 2100-128 to 2100-139; MPEP § 2143.01, pp. 2100-139 to 2100-141. Second,

there must be a reasonable expectation of success. MPEP § 2143.02, pp. 2100-141 to 2100-142 (8th ed. rev. 7 July 2008). Finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. MPEP § 2143.02, pp. 2100-141 to 2100-142 (8th ed. rev. 7 July 2008).

Independent Claim 1 has been amended to recite a “switch fabric configured to perform traffic prioritization and quality of service functions in a single process at the switch fabric.” This feature is not taught or suggested by Brandis, Krishna, or Thomas, separately or in combination. Brandis describes traffic prioritization that occurs at an ingress scheduler and/or an egress scheduler, not actually at the switch fabric. Moreover, Brandis does not teach or suggest anything about quality of service functions. While Krishna makes one mention of quality of service as it relates to fairness, Krishna does not teach or suggest a switch fabric that performs traffic prioritization and quality of service functions in a single process. Thomas does not cure the deficiencies of Brandis and Krishna.

Therefore, Claim 1 is patentable over Brandis, Krishna, Thomas, and any combination of the three. Independent Claims 10 and 19 recite features analogous to those of Claim 1 discussed above. Accordingly, Claims 10 and 19 are also patentable over Brandis, Krishna, Thomas, and any combination of the three. The remaining claims depend from the independent claims and are therefore patentable at a minimum due to their dependence from allowable base claims.

Accordingly, the Applicants respectfully request withdrawal of the § 103 rejection.

CONCLUSION

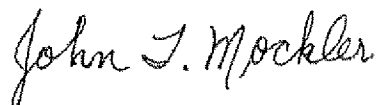
As a result of the foregoing, the Applicants assert that the remaining claims in the Application are in condition for allowance, and respectfully request that this Application be passed to issue.

If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicants respectfully invite the Examiner to contact the undersigned at the telephone number indicated below or at *jmockler@munckcarter.com*.

The Commissioner is hereby authorized to charge any fees connected with this communication (including any extension of time fees) or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

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